

tion, or sensible coolness, may be measured by the difference between the dry and wet bulb thermometers, in which case the resulting sensible temperatures are simply the temperatures of the wet-bulb thermometer as obtained by the whirling apparatus used in the shaded shelter, and correspond to the temperatures felt by persons standing in the shade of trees or houses, exposed to a natural breeze of at least 6 miles per hour. The temperature of the wet-bulb thermometer and

its depression below the dry bulb are the fundamental data for all investigations into the relation between human physiology and the atmosphere. In order to present a monthly summary of the atmospheric conditions from a hygienic and physiological point of view, Table VIII has been prepared, showing the maximum, minimum, and mean readings of the wet-bulb thermometer at 8 a. m. and 8 p. m., seventy-fifth meridian time.

PRECIPITATION.

[In inches and hundredths.]

The distribution of precipitation for the month of March, 1895, as determined by reports from about 2,500 stations, is exhibited on Chart III. The numerical details are given in Tables I, II, and III.

The precipitation for the current month was heaviest, 6 to 13 inches, on the coasts of Washington and Oregon, but least, averaging less than 0.5, from western Texas north to Manitoba and Saskatchewan.

The diurnal variation is shown by Table XII, which gives the total precipitation for each hour of seventy-fifth meridian time, as deduced from self-registering gauges kept at about 43 regular stations of the Weather Bureau; of these 37 are float gauges and 3 are weighing gauges.

The normal precipitation for each month is shown in the Atlas of Bulletin C, entitled "Rainfall and Snow of the United States, compiled to the End of 1891, with Annual, Seasonal, Monthly, and other Charts."

The current departures from the normal precipitation are given in Table I, which shows that precipitation was deficient over Canada, New England, the Atlantic coast north of Cape Hatteras, southern Florida, the greater part of Mississippi, Louisiana, Arizona, as also the northern part of the United States; it was generally in excess over the central portion of the United States. The large departures from the monthly normal were: excesses, Neah Bay, 5.0; Mobile, 3.1; deficits, Portland, Oreg., 3.2; Chatham, N. B., 3.1.

The average departure for each district is given in Table I. By dividing these by the respective normals for this month the following corresponding percentages are obtained (precipitation is in excess when the percentages of the normal exceeds 100):

Above the normal: South Atlantic, 122; Key West, 118; east Gulf, 115; west Gulf, 103; northern slope, 115; north Pacific, 107; south Pacific, 127.

Normal: Missouri Valley, 100.

Below the normal: New England, 81; south Atlantic, 77; Ohio Valley and Tennessee, 73; Lower Lake, 54; Upper Lake, 39; North Dakota, 19; Upper Mississippi, 59; middle slope, 78; Abilene (southern slope), 10; southern plateau, 27; middle plateau, 41; northern plateau, 75; middle Pacific, 66.

The years of greatest and least precipitation are given in the REVIEW for March, 1894. The precipitation for the current month was not the greatest on record at any regular station of the Weather Bureau, but it was the least on record at Moorhead, 0.03; Green Bay, 0.41; Kansas City, 0.95; Spokane, 0.57; Carson City, 0.41; Tucson, trace.

The total accumulated monthly departures from normal precipitation from the beginning of the year to the end of the current month are given in the second column of the following table; the third column gives the ratio of the current accumulated precipitation to its normal value.

Districts.	Accumulated departures.	Accumulated precipitation.	Districts.	Accumulated departures.	Accumulated precipitation.
	Inches.	Per cent.		Inches.	Per cent.
South Atlantic	+ 2.50	120	New England	- 3.90	89
Key West	+ 2.30	147	Middle Atlantic	- 1.90	83
Northern slope	+ 0.40	123	East Gulf	- 1.30	75
Middle slope	+ 0.20	105	West Gulf	- 2.50	73
South Pacific	+ 2.80	145	Ohio Valley and Tenn.	- 3.00	55
Middle plateau	0.00	100	Lower Lakes	- 2.60	65
Southern slope (Abilene) ..	0.00	100	Upper Lakes	- 1.70	73
			North Dakota	- 0.80	60
			Upper Mississippi	- 2.70	58
			Missouri Valley	- 1.20	73
			Southern plateau	- 0.40	75
			Northern plateau	- 1.80	70
			North Pacific	- 3.00	85
			Middle Pacific	- 0.60	98

Details as to excessive precipitation are given in Tables XIII and XIV.

The total snowfall at each station is given in Table II.

WIND.

LOCAL STORMS.

Destructive or severe local storms were reported as follows:

3d.—Augusta, Ga., tornado; funnel-shaped cloud.

7th.—Near Alco and Brewton, Ala., windstorms. Pensacola, Fla., thunderstorm.

8th.—Charlotte, N. C., and Knoxville, Tenn., windstorms. Nashville, Tenn., thunderstorm.

10th.—Meade, Kans., thunderstorm; several persons stunned.

13th.—Lindsey, Clayton, and Oneonto, Ala., windstorms. Oxford, La., thunderstorm.

14th.—Montgomery, Ala., thunderstorm. Oneonto, Ala., windstorm.

15th.—Parkersburg, W. Va., sleetstorm.

20th.—Columbus, Ga., rainstorm.

23d.—Hillsboro, Wis., windstorm.

24th.—Franklin, Ky., thunderstorm.

25th.—Altamont, N. Y., windstorm. Pittsburg, Pa., Delaware, Kilbourne, Milfordton, and New Moscow, Ohio, thunderstorms.

26th.—Muncie, Ind., windstorm.

27th.—Wheeling, W. Va., thunderstorm; horse killed by lightning.

28th.—New York, N. Y., windstorm.

30th.—McCune and Versailles, Mo., thunderstorms. Amarillo, Tex., windstorm and small whirlwind. Cheyenne, Wyo., and Denver, Colo., snowstorms.

31st.—Auburn, Nebr., thunderstorm.

The *prevailing winds* for February, 1895, viz, those that were recorded most frequently at Weather Bureau stations, are shown in Table I.

The *resultant winds*, as deduced from the personal observations made at 8 a. m. and 8 p. m., are given in Table IX. These latter resultants are also shown graphically on Chart II, in connection with the isobars based on the same system of simultaneous observation; the small figure attached to each arrow shows the number of hours that this resultant prevailed, on the assumption that each of the morning and evening observations represents one hour's duration of a wind of average velocity; these figures (or the ratio between them and the total number of observations in this month) indicate the extent to which winds from different directions counterbalanced each other.

Maximum wind velocities of 50 miles or more per hour were reported at regular stations of the Weather Bureau as follows (maximum velocities are averages for five minutes;

extreme velocities are gusts of shorter duration, and are not given in this table):

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
		Miles				Miles	
Amarillo, Tex.....	22	52	sw.	Fort Canby, Wash.....	22	58	s.
Cheyenne, Wyo.....	22	50	nw.	Do	25	62	se.
Do	23	56	w.	Do	31	50	se.
Chicago, Ill.....	3	50	ne.	Hatteras, N. C.....	21	54	n.
Do	4	50	ne.	Huron, S. Dak.....	21	58	se.
Do	23	50	sw.	Do	23	52	s.
Do	24	50	sw.	Kittyhawk, N. C.....	8	50	sw.
Dodge City, Kans.....	30	51	s.	Do	16	52	ne.
El Paso, Tex.....	15	52	sw.	Do	20	54	n.
Do	29	54	sw.	Do	21	54	n.
Fort Canby, Wash.....	15	53	se.	Lexington, Ky.....	8	50	nw.
Do	19	71	se.	New York, N. Y.....	28	64	nw.
Do	20	56	s.	Tatoosh Island, Wash.	2	50	w.
Do	21	72	s.	Winnemucca, Nev.....	21	52	sw.

SUNSHINE AND CLOUDINESS.

The quantity of sunshine, and therefore of heat, received by the atmosphere, as a whole, is very nearly constant from year to year, but the proportion received by the surface of the earth depends largely upon the absorption by the atmosphere, and varies with the distribution of cloudiness. The sunshine is now recorded automatically at 17 regular stations of the Weather Bureau by its photographic, and at 27 by its thermal effects. The results are given in Table XI for each hour of local, not seventy-fifth meridian, time. The cloudiness is determined by numerous personal observations at all stations during the daytime, and is given in the column of "average cloudiness" in Table I; its complement or clear sky is given in the last column of Table XI.

COMPARISON OF SUNSHINE AND CLEAR SKY.

The sunshine registers give the *duration* of direct sunshine whence the percentage of possible sunshine is derived; the observer's personal estimates give the percentage of *area* of clear sky. It should not be assumed that these numbers should agree, and for comparative purposes they have been brought together, side by side, in the following table, from which it appears that, in general, the instrumental record of percentages of duration of sunshine is almost always larger than the observer's personal estimates of percentages of area of clear sky; the average excess for March, 1895, is 7 per cent for photographic records, and 13 per cent for thermo-

metric records. The details are shown in the following table:

Difference between instrumental and personal observations of sunshine for March, 1895.

Photographic stations.	Instrumental.	Personal.	Difference.	Thermometric stations.	Instrumental.	Personal.	Difference.
Tucson, Ariz.....	80	64	16	Key West, Fla.....	88	65	18
Santa Fe, N. Mex.....	75	57	18	Marquette, Mich.....	82	44	38
Denver, Colo.....	72	59	13	Baltimore, Md.....	70	53	17
Dodge City, Kans.....	72	61	11	St. Louis, Mo.....	69	55	14
Kansas City, Mo.....	65	54	11	Chicago, Ill.....	68	60	8
Helena, Mont.....	61	57	4	Portland, Me.....	68	42	26
Salt Lake City, Utah*.	61	39	22	San Francisco, Cal.....	68	49	19
San Diego, Cal.....	59	52	7	Atlanta, Ga.....	65	50	15
Savannah, Ga.....	55	54	1	Des Moines, Iowa.....	64	49	15
Bismarck, N. Dak.....	57	58	-1	Vicksburg, Miss.....	63	60	3
Cincinnati, Ohio.....	57	48	9	Salt Lake City, Utah*.	62	39	23
Spokane, Wash.....	55	35	18	New York, N. Y.....	62	44	18
Galveston, Tex.....	52	55	-3	New Haven, Conn.....	61	52	9
Eastport, Me.....	51	37	14	Norfolk, Va.....	61	55	6
Memphis, Tenn.....	46	47	-1	Washington, D. C.....	59	50	9
Portland, Oreg.*.....	46	46	0	Boston, Mass.....	58	43	15
Cleveland, Ohio.....	40	44	-4	Detroit, Mich.....	58	46	12
				Louisville, Ky.....	57	46	11
				Philadelphia, Pa.....	57	46	11
				Rochester, N. Y.....	57	55	2
				Columbus, Ohio.....	56	40	16
				Buffalo, N. Y.....	55	40	15
				New Orleans, La.....	54	54	0
				Wilmington, N. C.....	53	53	0
				Little Rock, Ark.....	52	45	7
				Portland, Oreg.*.....	48	46	2
				Seattle, Wash.....	46	35	11

* Records kept by both registers.

ATMOSPHERIC ELECTRICITY.

The statistics relative to auroras and thunderstorms are given in Table X, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

The dates on which reports of thunderstorms for the whole country were most numerous were: 8th, 60; 12th, 63; 13th, 59; 14th, 65; 25th, 147; 30th, 109; 31st, 97. Thunderstorms were most numerous in Ohio, Missouri, Mississippi, South Carolina, Alabama, Georgia, Louisiana, Pennsylvania, Florida, and Texas. Thunderstorm days were most frequent in Ohio, where they numbered 16; Arkansas, 13; Alabama, Mississippi, and South Carolina, 12; North Carolina and Tennessee,

11. *Severe thunderstorms* are especially mentioned under "Local Storms."

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, from the 6th to the 14th, inclusive. On the remaining twenty-two days of this month 241 reports were received, or an average of about 11 per day. The dates on which the reported number especially exceeded this average were: 13th, 17; 14th, 36; 16th, 59; 22d, 16.

Auroras were reported by a large percentage of observers in Maine, Minnesota, New Hampshire, New York, North Dakota, South Dakota, and Wisconsin.